Zero Retries issue 0092 2023-03-31

Zero Retries is an independent newsletter about technological innovation in Amateur Radio. Zero Retries promotes Amateur Radio as (literally) a license to experiment with radio technology.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Request To Send

BEACON Edition well received

My experiment in Zero Retries 0091 to publish a second edition of Zero Retries - the BEACON Edition (The Quick Mentions Edition of Zero Retries) seemed a success. Of the 17 votes (out of 750+ readers), 65% voted "Love the idea". Good enough for now.

N2RJ Has Resigned as Hudson Division Director (and ARRL Board)

Regarding the discussion of Ria Jairam N2RJ being sanctioned by the ARRL Board (**Request to Send** in Zero Retries 0082 *and* Zero Retries 0083), it's noteworthy that N2RJ has now resigned as Director of ARRL's Hudson Division. I said previously:

> In the end, the fallout of that bad decision is going to hurt ARRL. Perhaps it will hurt minimally, or it may hurt severely - too soon to tell. The ARRL Board is on the wrong side of history on this issue - it's being hyper protective and insular when it should be looking at the bigger picture.

ARRL CEO David Minster N2AA espouses rhetoric about building diversity:

> To change the look of amateur radio from a diversity perspective will take many years. Focusing —

> seriously focusing — on youth programs and STEM education outreach today is the only realistic future for amateur radio to replace the tens of thousands of hams who will leave the hobby in the coming decade.

In talking to younger folks, a primary thing they've told me is that they just don't "see themselves represented" in Amateur Radio. What they do see, especially in ARRL and especially in ARRL leadership is mostly not young, mostly male, not much racial diversity, etc. ARRL will have a hard time in their recruitment of youth and "STEM education outreach" if those youth being recruited don't "see themselves represented".

Thus, in my opinion, the resignation of N2RJ from ARRL leadership is a *significant* loss to ARRL as a whole and its leadership in particular, because seeing N2RJ in a leadership role at the ARRL did provide some of that needed "see themselves represented".

Now they won't.

de Steve Stroh N8GNJ

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Amateur Radio and the *Big* Disruption

By Steve Stroh N8GNJ

Amateur Radio Emergency Communications… and emergency communications in general, operate under the assumption that a communications emergency occurs when normal communications infrastructure is damaged or overwhelmed. Examples are hurricanes, floods, wildfires, etc.[1] It's further assumed that with planning and preparation such as building Emergency Operations Centers (EOCs), communivations vehicles, trained professionals and volunteers, hardened emergency communications facilities, reservoir of emergency equipment, etc. that emergency communications can be maintained.

But what if those assumptions aren't valid? What if a disaster occurred that completely disrupted the telecommunication infrastructure we depend on - multiple systems simultaneously disrupted?

The following is purely a thought experiment… at the moment.

My news sources are eclectic and varied. I've been graciously included in three "communities of thought" where I'm usually the dumbest person in the conversation. Thus, mostly I read and learn. Over the decades, I've seen these communities (collectively) offer perspectives and predictions that have often turned out to be prescient. Having "proven themselves" (to me, anyway), I've come to pay attention when these communities of thought start highlighting worrisome trends.

One such trend that's been discussed lately is anticipating "the next *big* one". Not a natural disaster, not a major economic downturn but an event that would affect multiple major infrastructure in the US, *simultaneously*. Just imagine the impact of an event that shuts down…

- *A* mobile telephone network (example, T-Mobile),
- *A* major Internet Service Provider (example, Comcast),
- *A* primary telephone network that provides E911 services (example, CenturyLink),
- *A* major credit card company (example, Mastercard),
- *A* major cloud services provider (example, Google Gmail),

- *A* VSAT (Very Small Aperture Terminal) satellite services operator (example, gas stations verify gas purchases via satellite to authorize a gas pump to dispense gas),
- *An* airline's reservation / scheduling system goes offline (example, Southwest),
- *A* major city's traffic coordination system that dynamically sequences traffic lights (example, New York City).
- *A* petroleum pipeline company whose pipeline monitoring system goes offline and thus has to shut down the pipeline (example, Columbia Gas).
- *A* major power grid goes down for hours… or days… (example, New York City blackout, Texas ice storm).

The above doesn't factor in the second-order effects; for example, the Texas power grid not only affected electrical power, but disrupted food distribution (grocery stores couldn't operate), credit cards couldn't be used, gas stations (generally) could not pump and sell gas, etc.

What's really sobering in the above scenarios is that each of these disruptions *has happened*… just (fortunately) not *all* at once. Some of those scenarios have happened *multiple times*.

The above scenario also doesn't factor in the possibility that not just "*A*" segment of communications infrastructure gets shut down, or smaller combinations get shut down.

W*hat… if it* ***all…*** *gets shut down?* As in:

- *All* mobile telephone networks,
- *All* major Internet Service Providers,
- *All* primary telephone networks that provide E911 services,
- (Etc.)

Insane? Unimaginable? Impossible? ***Just cannot happen?***

I posit that it such a scenario *is* sane, *is* imaginable, *is* possible, and *could happen*.

In discussing the following scenarios, I'm not giving over Zero Retries to doomsday scenarios / apocalyptic justifications for "prepping", etc. Outlining these scenarios - briefly, incompletely, and perhaps inaccurately, is merely scene-setting for the primary discussion about how Amateur Radio could be part of the solution.

Scenario 1 - Overwhelming cyberattack.

We in the US are *wholly* dependent on our telecommunications infrastructure. Many of us don't even carry any cash - we just have our credit or debit cards (or equivalent on a smartphone) and with the ability to instantly verify validity of the funds in the account, which is very convenient. Very few of us have "landlines" any more, and if we do, they're probably Voice Over Internet Protocol (VOIP) telephones. Most of us don't receive paper bills for our services, just email notifications of automatic electronic debits and deposits.

Thus a cyberattack that significantly disrupts the US telecommunications (and other) infrastructure would be *devastating*. It wouldn't be a cyber *attack*… such a massive attack would be a cyber *war*. All of the cyberattacks to date can (in my opinion) be described as skirmishes, or at most, minor battles - not a cyber *war*. But cyberwar isn't a distant possibility[2] - cyber war against the US is, by far, *the most likely opening move* when China decides it's time to "take back" Taiwan.

Scenario 2 - Carrington Event Scale Coronal Mass Ejection (CME)

Zero Retries Pseudostaffer Jeff Davis KE9V offers this succinct explanation:

> **Kill Shot**
> *March 24, 2023*
>
> A massive eruption of solar material, known as a coronal mass ejection or CME, was detected escaping from the Sun at 11:36 p.m. EDT on March 12, 2023. The CME erupted from the side of the Sun opposite Earth. Fortunately, it wasn't a replay of the Carrington event of 1859. The eruption was on the opposite side on the Sun, facing away from the earth.
>
> Dodging the Apocalypse by J.R. Dunn
>
> Estimates suggest it was ten to one hundred times more powerful than the 1859 event. Had it been an earth-facing, direct, head-on **kill-shot**, well, you wouldn't be reading this.

Scenario 3 - Electromagnetic Pulse (EMP) (Nuclear Explosion in Atmosphere)

An enemy attacking the US by causing an EMP is perhaps even likelier than initiating cyber war, and perhaps even more effective. Unlike increasing security on telecommunications infrastructure to reduce the severity of cyberattack / cyberwar, little can be done (with less than military budgets) to protect electronic systems against EMP. Thus an EMP would be devastatingly effective.

…

In all three scenarios, telecommunications as we (civilians know it) would effectively cease to exist, for a significant period. So, what could *Amateur Radio* do? We'd like to think that Amateur Radio wouldn't be much affected by a cyber attack / cyber war… but is that *true*? Think about how much Amateur Radio has come to rely on Internet access - to manage repeaters and operate repeater networks; operate remote stations when you can't have antennas on premise, how microwave networks are interconnected with Internet, how a lot of "Amateur Radio" activity is (in reality) VOIP through Internet-connected "Hotspots", Winlink, Automatic Packet Reporting System (APRS) aggregating to Internet servers and websites, etc.

I take little pleasure in suggesting that, perhaps, Amateur Radio might want to attempt to "live without Internet" 3 to see what that particular worst-case scenario might be like in its roles as "communications of last resort".

But for the CME and EMP scenarios… they're hard to imagine… but looking backwards in history, sometimes we suffer most precisely from such a failure of imagination about worst-case scenarios. For communications, most of us could be reduced to using to smoke signals, carrier pigeons, or messengers running around with pieces of paper. Almost anything with an antenna, or connected to a power line will be disabled.

Except, perhaps, for the RFBitBanger radio. I confess to being a bit (mentally) dismissive of this project, thinking it was yet another "scratching *my* itch" low power HF radio project. That is, until I made the connection between the above, and this description of the RFBitBanger:

> The RFBitBanger is an off-the-grid QRP radio. It is not just designed to be used off the grid, it is designed *to be assembled and maintained off-the-grid*. Most radios require specialized parts that would be difficult to obtain in an extreme parts shortage or in remote places. This radio is designed to be assembled and maintained using the most common jellybean components that might be in a hobbyist junkpile. It will mainly support low bandwidth/digital modes to make the most of limited power.

The first prototype of the RFBitBanger transmitting was demo'ed on YouTube a few weeks ago by Paul Williamson KB5MU:

Note that the RFBitBanger is *not* a voice radio with a modem driving the (audio) input. This prototype supports only data, though there is a reference to potentially supporting voice (Single Sideband - SSB). The built-in data modes include Continuous Wave (CW), Radio Teletype (RTTY), and SCAMP - a new mode which includes Frequency Shift Keybing (FSK) and On / Off Keying (OOK). SCAMP implements Forward Error Correction (FEC).

The RFBitBanger uses a keyboard with a PS/2 interface as the input device; I'll guess the PS/2 interface is simply easier to interface with a simple microcontroller.

I'm not highlighting the RFBitBanger as the ultimate "Post Carrington" radio… but the design choices for it *are* something to think about. It certainly has *me* thinking.

Putting aside our cynicism about the future of Amateur Radio…
I'm probably more guilty than most of being cynical about the future of Amateur Radio in providing emergency communications. I'm seeing more and more stories about emergency services providers quietly saying "Thanks, but no thanks" to Amateur Radio involvement. I continue to feel that my cynicism is valid in the "Edge of the Disaster" scenarios that are typical now, given that Iridium, FirstNET, and Starlink are now able to quickly provide tactical voice, data, and Internet into disaster zones.

But the phrase *When All Else Fails*[4] assumes new meaning when those three scenarios are seriously considered. When *all*... ***literally… all***... else fails, hopefully Amateur Radio will be usable because some of our best and brightest thought through those unimaginable scenarios and were ready with modest systems with no external dependencies, and people with training, that *can* function when we need them the *most*.

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Building a Linux Packet Node (YouTube)

By Steve Stroh N8GNJ

Though this video is now one year old, all the observations Jim Beno K2YE offers about building a first generation, and then second generation multiport, multi-radio Packet Radio node are still valid. While a Packet Radio digipeater can be as simple as a KPC-3+ and a radio, usually one wants to do more than simple digipeating. At that point, things get a bit complicated and one ends up launching a treasure hunt5 for the bits of info needed.

There was a funny moment (approx. 31:33) when K2YE struggled to explain what the "J" in JNOS represented. The origin story of ***J***NOS is often lost to history now, but JNOS was created by Johannes Reinalda WG7***J***, who became a minor hero to the TCP/IP experimenters in the Seattle area.

Network Operating System - NOS (which JNOS was based on) was created by Phil Karn KA9Q as a TCP/IP router running on MS-DOS that worked with Ethernet or SLIP (Serial Line Internet Protocol) and Amateur Radio devices such as KISS TNCs, 56k interfaces, etc. KA9Q's view of networking was "TCP/IP is the answer… what was the question again?". TCP/IP was exotic technology in the early days of Amateur Radio Packet Radio, so KA9Q created NOS as a demonstration that yes, TCP/IP was feasible to use in Amateur Radio.

In the NOS era, the "Wetnet Mafia" in the Seattle area had set up multiple repeaters (yes, full duplex *repeaters*) running 9600 bps and doing TCP/IP (over AX.25). We were having a really good time experimenting.

WG7J (a grad student, if memory serves) was a kindred spirit of us TCP/IP experimenters, but lived in the Portland, Oregon area. WG7J wanted to experiment with us, but the only Amateur Radio "infrastructure" available to *him* was (AX.25) 1200 bps Net/ROM nodes and Bulletin Board Systems.

So, to communicate with us in the Seattle area, WG7J created JNOS by adding the capability to "tunnel" TCP/IP packets through Net/ROM networks, and tunnel Internet style email through BBS systems and BBS forwarding networks.

It was great fun for those of us in the Seattle area to exchange network traffic and email with WG7J. WG7J was a hero to us, and many of us switched to running JNOS - WG7J was a very responsive regarding bug fixes and new features!

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Talkpod A36Plus Portable Radio - “7 Bands”

The full product name is *Talkpod A36Plus GMRS Amateur Ham Two-Way Radio 512 Channel, 5W, 7-Band Receive With AM AIR VHF UHF*. 😉

While the prose is… a bit breathless for the Talkpod A36Plus, it’s “interesting” to see how Chinese manufacturers such as Talkpod continue to blur the lines between various radio services, and how “stuck in the 1970s” US radio regulations are in comparison. For example…

Transmit ranges:

- 136 - 174 MHz
- 400 - 512 MHz

(TX is noted as “Locked to Ham”)

Receive ranges:

- 76 - 108 MHz (FM Broadcast Radio)
- 108 - 136 MHz (AM Aircraft)
- 136 - 180 MHz
- 230 - 250 MHz
- 350 - 400 MHz
- 400 - 512 MHz
- 700 - 985 MHz

Other than that, the A36Plus is pretty typical, except for the price - *$59.00*… and the Lime Green color. It’s nice that charging portable radios has now migrated to USB-C.

Radios like the A36Plus just keep coming at us, amazingly inexpensive. At some point, it’s just… *ineffective* to attempt to maintain regulatory distinctions of different certification / technical requirements of radios for different radio services such as Amateur Radio, General Mobile Radio Service (GMRS), Multiple Use Radio Service (MURS), Family Radio Service (FRS), etc. Trying to maintain those distinctions is increasingly a fool’s errand… akin to shoveling sand against the tide.

In attempting to understand why the FCC simply ignores the blurring of regulatory lines inherent in radios such as the A36Plus, I fall back on a conversation I had a couple of decades ago with a very senior staff member of the FCC. The conversation took place at an industry conference, in a bar, with beers in hand. I asked:

> There was a story, *on the front page of the Wall Street Journal*, about a guy using “Russian Army surplus” antennas connected to Part 15 radios, which, of course, is an “non-certified” combination. (It doesn’t *get* much more “non-certified” than “Russian Army surplus”). *Why* didn’t the FCC do something about that blatant disregard of its Part 15 Rules?

The very senior staff member’s answer was succinct:

> Simple… *no one complained to the FCC!*

Despite what is now a polite fiction of regulations and technical requirements, it's my guess that *everyone* is enjoying radios like the A36Plus, and no one is complaining to the FCC.

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Feedback Loop

Comments:

- **Rob Sipes** re: Zero Retries 0091 - *I was supposed to Winter-over at Amundsen-Scott, aka South Pole Station back in 1996 after I separated from the Air Force*.
- **Alexander DL4NO** re: Zero Retries 0091 - *My emergency solar power supply uses 12 V because of my ham radio equipment*.
- **ReadyKilowatt** re: Zero Retries 0091 - *I replaced my old Goal Zero powerbank with a Ecoflow Delta Max unit with updated solar panels and their generator.*

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) - In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- **Pseudostaffers** Dan Romanchik KB6NU and Jeff Davis KE9V for continuing to spot, and write about "Zero Retries Interesting" items on their blogs that I don't spot on my own.
- **Newsletters** that regularly feature Zero Retries Interesting content:
    - Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
    - Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC.
- **YouTube channels** that regularly feature Zero Retries Interesting content:

    - HB9BLA Wireless by Andreas Spiess HB9BLA
    - KM6LYW Radio by Craig Lamparter KM6LY (home of the DigiPi project)
    - Modern Ham by Billy Penley KN4MKB
    - Tech Minds by Matthew Miller M0DQW
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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Zero Retries (N8GNJ) is on Mastodon - n8gnj@mastodon.radio - just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-03-31

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

I've heard this philosophy of emergency communications described as "The edge of the disaster scenario". As in *beyond* the edges of the disaster, normal communications infrastructure is working and available. Thus, in this scenario, the job of emergency communications is to bridge from the area where communications infrastructure is damaged into an area where communications infrastructure is functioning normally.

2

See article by US Naval Institute - U.S. Should Create Military Cyber Force to Help Deter China, Experts Tell Congress.

3

Gosh help me… Charles Brabbham N5PVL (Silent Keyboard) might have been at least partially right after all.

4

Which I did not realize is a Registered Trademark of ARRL…

5

Yet another reason to celebrate Digital Library of Amateur Radio & Communications (DLARC) - despite being long out of print (and unavailable as print-on-demand), books on Packet Radio are available from DLARC.